Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DANIEL E. GRUPP

Appeal No. 2002-0243
Application No. 09/612,607

ON BRIEF

Before THOMAS, BARRETT and OWENS, *Administrative Patent Judge.*

OWENS, *Administrative Patent Judge.*

DECISION ON APPEAL

This appeal is from the final rejection of claims 23-25, which are all of the claims pending in the application.

THE INVENTION

The appellant claims a method for forming a conduction path between a pair of tunnel junctions. Claim 23 is illustrative:

23. A method, comprising forming a conduction path between

a pair of tunnel junctions each having a resistance less than or equal to approximately a quantum resistance[1] by shifting energy states of an island formed of a material having a non-uniform density of energy states,[2] the island being disposed between the tunnel junctions.

THE REFERENCE

Serge Luryi and Federico Capasso (Luryi), "Resonant tunneling of two-dimensional electrons through a quantum wire: A negative transconductance device", 47 *Appl. Phys. Lett.* 1347-49 (1985).

THE REJECTION

Claims 23-25 stand rejected under 35 U.S.C. § 102(b) as being unpatentable over Luryi.[3]

OPINION

We affirm the aforementioned rejection.

The appellant states that the claims stand or fall together (brief, page 4). We therefore limit our discussion to the sole independent claim, i.e., claim 23. *See In re Ochiai*, 71 F.3d

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[1] The appellant states that a quantum resistance is 26 KOhms (specification, page 4, lines 22-23).

[2] The appellant states that a material having a nonuniform density of energy states is one having "at least one region that contains available energy states adjacent to at least one region that does not contain any available energy states" (specification, page 6, lines 6-7).

[3] A rejection of claims 23-25 under 35 U.S.C. § 112, second paragraph, is withdrawn in the examiner's answer (page 3).

1565, 1566 n.2, 37 USPQ2d 1127, 1129 n.2 (Fed. Cir. 1995); 37 CFR § 1.192(c)(7)(1997).

Luryi discloses a method comprising forming a resonant tunneling structure (abstract). The structure includes a pair of AlGaAs barrier layers which the examiner relies upon as being the appellant's tunnel junctions (answer, page 3). It is undisputed that each of the AlGaAs barrier layers has a resistance less than or equal to approximately a quantum resistance.[4] Between the AlGaAs barrier layers is a GaAs layer (figure 1) which the examiner relies upon as being the appellant's island (answer, page 3). Because, as pointed out by the appellant (specification, page 11, lines 11-12), the island can be any semiconductor material, Luryi's GaAs semiconductor material necessarily has the nonuniform density of energy states required of the appellant's island material. Luryi can control resonant tunneling by use of a gate voltage that shifts those energy states (page 1349).

The appellant argues that "[t]he present claims make it

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[4] The appellant states that the appellant's tunnel junctions which have a resistance less than or equal to approximately a quantum resistance can be made of an insulating material, such as silicon dioxide or aluminum oxide, or can be made of an oxide of the material of which the island is made (specification, page 7, lines 9-10; page 10, lines 17-19).

clear that a non-uniform density of states is a specific property of the island material, not one arising from geometrical structures in the device, as in a quantum well" (brief, page 5). Because, as indicated by the appellant's specification (page 6, lines 5-6; page 11, lines 11-12), a nonuniform density of energy states is a property of semiconductors, Luryi's GaAs semiconductor necessarily has that property.

The appellant argues that "the present invention relates to a device having a non-uniform density of energy states. That is, a device in which separated conduction and valiance [sic, valence] bands behave as continuous, and not quantum, energy bands" (brief, page 5). The appellant's specification states that a material having a nonuniform density of energy states is a material that has "at least one region that contains available energy states adjacent to at least one region that does not contain any available energy states" (page 6, lines 6-7). The appellant's specification also states that the spacing between the energy levels of the island material depends upon the material and the size of the island, and that it is preferred that the energy levels are spaced by a maximum of 100meV so that the valence and conduction bands behave as approximately continuous bands, thereby causing electrons at room temperature

to have enough thermal energy to travel between the energy levels (page 13, lines 17-26). Thus, the specification indicates, contrary to the appellant's argument, that the conduction and valence bands behaving as continuous energy bands is not necessarily a characteristic of the material having a nonuniform density of energy states required by claim 23 but, rather, is a feature of a preferred island design not required by claim 23.

The appellant argues that "[t]he band structure of the [appellant's] device may look similar to that of Luryi's quantum well, but the origin of this structure is entirely different" (brief, page 5). By "origin of this structure" the appellant apparently is referring to features that are not required by claim 23. Any such non-claimed features are not useful for distinguishing over Luryi the method claimed in that claim. *See In re Self*, 671 F.2d 1344, 1348, 213 USPQ 1, 5 (CCPA 1982).

We therefore find that the appellant's claimed method is anticipated by Luryi.

DECISION

The rejection of claims 23-25 under 35 U.S.C. § 102(b) over Luryi is affirmed.

AFFIRMED

JAMES D. THOMAS)
Administrative Patent Judge)
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